

This fact sheet answers the most frequently asked health questions (FAQs) about phosphine. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** The general population may be exposed to very small amounts of phosphine in air, food or water. Workers who use this chemical may be exposed to higher levels. Exposure to phosphine can cause abdominal pain, nausea, and vomiting. High levels can cause weakness, bronchitis, pulmonary edema, shortness of breath, convulsions, and death. Phosphine has been found in at least 7 of the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA).

## What is phosphine?

Phosphine is a colorless, flammable, and explosive gas at ambient temperature that has the odor of garlic or decaying fish. Small amounts occur naturally from the break down of organic matter. It is slightly soluble in water.

Phosphine is used in semiconductor and plastics industries, in the production of a flame retardant, and as a pesticide in stored grain.

## What happens to phosphine when it enters the environment?

In the air, phosphine will exist solely as a gas. Phosphine gas reacts with substances commonly found in the air. Half of the phosphine in the air degrades in about 1 day. At high concentrations, phosphine vapors may spontaneously combust in air.

Phosphine is expected to react with water and be broken down into other products. Some of the phosphine that is not broken down may evaporate into air.

When released to soil, phosphine is broken down very quickly.

Phosphine does not accumulate in the food chain.

## How might I be exposed to phosphine?

Phosphine breaks down rapidly in the environment so the general population may only be exposed to small amounts of this compound by inhaling air, drinking water and eating foods.

Since phosphine is used to kill insects and rodents in stored grain and tobacco, workers who use this product may be exposed to it. People who live near where it is being used may also breathe in small amounts of it.

## How can phosphine affect my health?

Inhalation is the most likely route of exposure to phosphine. Early symptoms of acute phosphine intoxication include pain in the diaphragm, nausea, vomiting, excitement, and a phosphorus smell on the breath. Higher levels can cause weakness, bronchitis, pulmonary edema, shortness of breath, convulsions, and death. Some effects, such as pulmonary edema, convulsions, and liver injury, may appear or continue to be present days after an exposure.

**ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>**

Long-term exposure to very low levels of phosphine can result in anemia, bronchitis, gastrointestinal effects, and visual, speech and motor problems.

Liquid phosphine on your skin can cause frostbite. Ingestion of metal phosphides results in release of phosphine in your stomach which can cause nausea, vomiting, abdominal pain, and diarrhea.

No information is available regarding reproductive effects in humans exposed to phosphine gas. Phosphine has not been shown to cause reproductive effects in laboratory animals.

### **How likely is phosphine to cause cancer?**

The EPA has determined that phosphine is not classifiable as to its human carcinogenicity.

### **How can phosphine affect children?**

Children appear to be affected by exposure to phosphine in the same ways as adults. Accidental exposure of children has resulted in vomiting, headache, fatigue, and damage to the heart. In a fatal case, a 2-year-old child died with congestive heart failure, pulmonary edema, congestion on the membranes that surround the lungs, enlarged spleen, and aspiration of the gastrointestinal contents.

We do not know if exposure to phosphine will result in birth defects or other developmental effects in people.

### **How can families reduce the risk of exposure to phosphine?**

Most families will not be exposed to significant levels of phosphine. However, consumption of food contaminated

with metal phosphide pesticide can produce phosphine intoxication when the solid phosphide contacts acid in the stomach.

Phosphine and metal phosphides are used to kill rats in areas used for grain storage, but should not be used in family dwellings.

Always store pesticides in safe containers, in a safe place out of the reach of children.

### **Is there a medical test to show whether I've been exposed to phosphine?**

There are no specific blood or urine tests for phosphine itself. Breakdown products of phosphine can be measured in urine. If a severe exposure has occurred, blood and urine analyses and other tests may show whether the lungs and heart have been damaged. These tests would most likely be performed in a hospital following severe exposure to phosphine.

### **Has the federal government made recommendations to protect human health?**

The Occupational Safety and Health Administration (OSHA) sets a limit of 0.3 parts of phosphine per million parts of workroom air (0.3 ppm) for an 8-hour work shift, 40 hour work week.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

